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<b>TRANSMITTAL FORM</b>  (to be used for all correspondence after initial filing)	Application Number	<u>09/871,383</u>
	Filing Date	<u>05.31.2001</u>
	First Named Inventor	<u>Edlin Solomon</u>
	Art Unit	<u>2815</u>
	Examiner Name	<u>Joseph Nguyen</u>
	Attorney Docket Number	<u>—</u>
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2815

Examiner – Joseph Nguyen

Applicant – Edlin Solomon

Reply mailed 07.15.2004.

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Reply No.10 to Notice received on 10.18.2002.

H01L 29/06

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## BIDIRECTIONAL BIPOLAR STATIC INDUCTION DEVICE

"paragraph 0001". The invention relates to microelectronics and more particularly to bidirectional bipolar static induction devices: transistor and transistor-thyristor (transistor, which can be latched) with elements of a control circuit. Any device, according to the present invention can be latched. However, if a thick channel drain electrode have been connected to an ordinary channel drain electrode and if the latch current of the device exceeds the maximum permissible current, such device can be considered as the device without latching, i.e. the transistor.

### background of the invention

"between paragraph 0001 and 0002". There exists a static induction type semiconductor device is used as a power transistor. It is of the surface gate type and is used for providing a high current density. The static induction type semiconductor device provides a plurality of a small source regions surrounded by a gate region. According to this structure the channel region beneath the source region becomes small, thereby increasing the stored carrier density and enabling a large main current to flow when using a small gate current, thereby achieving a high current amplification ratio. A thin insulating film provided on the surface of the n<sup>+</sup>-source region operates as a tunnel-oxidized film, thereby enabling electrons to be injected into the source region but preventing the positive holes from being drawn out. Therefore, as the consumption of positive holes store in the channel region decreases, a sufficiently large source current is allowed to flow even if a further smaller gate current is injected, thereby further increasing the current amplification factor[1]. The drawbacks of the transistor are that it cannot operate on circuits of alternating voltage and that the current density is insufficient.

There exists a vertical JFET, in which a gate and a channel are formed by the implantation of an impurity in a doped epitaxial layer through mask – a doped polysilicon source electrode[2]. The method provides forming of the transistor with channel thickness equal about 10.sup.-7 m. The drawback of the transistor is that it cannot operate on alternating voltage circuits.

"paragraph 0002". There exists a bipolar static induction transistor comprising elements of a bipolar static induction transistor: a gate, a source and a channel – on one of the sides of the substrate, and elements of a onejunction transistor: an emitter and a base (drain) – on the other [3]. This transistor has high current density and can switch high power. The drawback of the transistor is that it cannot operate on circuits of alternating voltage (to be more precise, it can be closed by applying only one of polarities of the drain-source voltage).

"paragraph 0003". There exists a bipolar transistor, which has structure actually comprising two bipolar transistors and which can operate in alternating-voltage circuit [4]. The drawback of the transistor is that it cannot has high technical characteristics. Its breakdown voltage, current density and switch power are low.